

NAVSTABREMINST 10330.1  
Code N444.9

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From: Commanding Officer, Naval Station Bremerton

Subj: OXYGEN DISTRIBUTION SYSTEM OPERATION, MAINTENANCE,  
INSPECTION, AND TESTS

1. Purpose. To define responsibilities for maintenance and use of the Bremerton naval complex Oxygen Distribution System.

2. Cancellation. This instruction replaces NAVSHIPYDPUGETINST 10330.7C.

3. Action

a. Heads of Shops will:

(1) Train personnel actively engaged in the use of oxygen and its inherent hazards (contact Code 106.22, 476-4361, for information). Also, any leaks and faulty or damaged valves in the oxygen distribution system should be immediately reported to Shop 03/07, Mechanical Dispatch at 476-2325. Any leaks and faulty or damaged valves in Shop 99's temporary distribution system (hose, manifolds, etc.) should be immediately reported to Shop 99 Dispatch office (day shift) @ 476-2283 (back shift or weekends) Pager #2636, and the Mechanical Dispatch at 476-2325.

(2) Ensure that personnel engaged in welding, cutting, or brazing make frequent tests and inspections of their equipment to detect leaks or other defects.

(3) Periodically caution employees against the use of oxygen for any purpose other than that for which it was intended. Oxygen shall never be used to ventilate or clear smoke/fumes from a compartment, nor shall it be used for cooling or blowdown purposes.

(4) Enforce safety precautions for all matters dependent upon the attachment of oxygen-consuming equipment to manifolds.

(5) The operation of service outlet valves located in buildings not on piers shall be the responsibility of the head of the shop charged with the security of the building.

(6) Observe safety precautions in the attachment, detachment, and maintenance of distribution hoses and manifolds used on piers and docks, and on board ships located at piers or in drydocks.

b. Shop 03/07 will:

(1) Inspect, maintain, operate, and test the fixed oxygen distribution system which extends from the point of connection to the contractor's facilities, located north of Building 426 (Shipyard side of the 2-inch tee), and at Building 460 from the 2-1/2 inch isolation valve to the discharge side of the permanently installed outlet valve, including hose adapters and caps.

(2) Provide operational surveillance of the system to assure adequate flow in the distribution system at all times.

(3) Inspect all areas for compliance with the provisions of this instruction.

(4) Detect abnormal operating pressure by means of the low- and high-pressure alarm systems in Building 460, in an enclosure adjacent to the tank north of Building 426, and remotely via SCADA in Building 900, Public Works Dispatch. If the alarm occurs during the regular working or backshift hours, Shop 03/07, Mechanical Dispatch, shall be immediately notified for subsequent corrective action.

c. Shop 99 will:

(1) Operate service outlet valves located on piers and drydocks.

(2) Observe safety precautions in the attachment, detachment, and maintenance of distribution hoses and manifolds used on piers and docks, and on board ships located at piers or in drydocks.

(3) The operation of valves between the discharge side of the service outlet valves and the point of use of the oxygen shall be the responsibility of the user.

#### 4. Maintenance and Inspection Requirements

a. Liquid Oxygen Unit

(1) These units are owned and maintained by a contractor. They consist of two insulated storage tanks, vaporizing equipment, and controls mounted on concrete slabs north of Building 426 and the southeast end of Building 460. They are

fully automatic and are each capable of delivering 20,000 cu. ft. per hour at 150 psi. The necessary safety switches and excess pressure safety devices shall meet the specifications of the National Fire Protection Association for bulk oxygen systems.

(2) The contractor shall accomplish delivery of liquid oxygen into the storage tanks. Normal method of delivery is by tank truck.

(3) The Government will furnish electrical power, as required, to the concrete slabs for operation of the contractor's equipment.

(4) Fleet Industrial Supply Center, Puget Sound's Industrial Support Department, Code 562.3 provides surveillance, as necessary, during contractor filling operations to assure adequate line pressure. Code 562.3 inspection responsibilities for this equipment are limited to daily observations that the supply of oxygen is being maintained up to the Shipyard oxygen distribution system 2-inch tee (located north of Building 426 and the system's 2-1/2 inch isolation valve located at Building 460). Code 562.3 is responsible for monitoring the piping and valves from the liquid oxygen tanks to the 2-inch tee (Building 426) and the 2-1/2 inch isolation valve (Building 460).

(5) Code 562.3 is responsible for de-icing the piping and valves from the liquid oxygen tank to the point of connection to the Shipyard Distribution 2-inch tee (Building 426) and the 2-1/2 inch isolation valve (Building 460). **All contractor valves in this area** shall be accessible and operable at all times.

b. Flowmeters: The flowmeters are Barton Flowmeters, consisting of flow indicators, daily flow recorders, and 7-day flow recorders in Building 426 and Building 460. Shop 03/07 shall inspect equipment and change charts weekly. Any abnormalities in pressure (high or low) should be investigated and corrected as necessary. The daily flow recorder charts shall be changed daily.

c. Low and High Pressure Alarms

(1) Two pressure switches are installed in the distribution system at the tank north of Building 426. The 90 psi low-pressure alarm actuates a bell at the tank north of Building 426, and Building 900, Mechanical Dispatch. Three additional pressure switches are installed in the distribution system of Building 460. The 90 psi low-pressure alarm actuates a bell in Building 460.

(2) Shop 03/07 will investigate and take remedial action if an alarm occurs during the regular working or backshift hours.

(3) For operational tests, see paragraph 5a(3).

d. Fixed Distribution System

(1) All valves under the jurisdiction of Shop 03/07 shall remain in the open position except the service outlet valves to piers, drydocks, and in shops. The main valves installed in the oxygen supply lines to the buildings shall not be closed at the end of each day or week. These valves shall be closed by Shop 03/07 in the event of fire or other catastrophe. Except in an emergency, no valve shall be closed in any oxygen supply line without first ensuring that the service outlet valves supplied by that line are closed.

(2) When it becomes necessary to secure all or part of the system, Shop 03/07 shall coordinate outages.

**(NOTE:** It shall be the responsibility of the person ordering the closure of the valves to notify shops involved as soon as it is considered safe to reopen the valves and remove tags. Shop 99 is responsible for locking the outlet valves at pier and dry dock locations. Shop 03/07 is responsible for closure and tagging of all other valves.)

(3) In the event that the distribution line pressure drops from the normal 125 psi to 90 psi or lower, an emergency alarm will sound at the site north of Building 426 or Building 460, and in Building 900, Mechanical Dispatch. With line pressure below 90 psi and a flow rate in excess of 20,000 cubic feet per hour, a break in the distribution system is indicated. If this occurs, the Shop 03/07 Superintendent shall be notified. If this occurs at any time other than during the day shift, the shops using oxygen and the Shop 03/07 Mechanical Dispatch should be notified. When the flow rate has continued unabated for 10 minutes, or the pressure drops below 30 psi, the distribution line main supply valve shall be closed, and Shops 03/07 personnel notified. Before reopening the distribution line main valve, the following shall be accomplished:

(a) Shop 03/07 will notify their Foreman or General Foreman.

(b) Purge any parts of the distribution system with oxygen where the interior of the piping could become contaminated due to the pressure dropping to atmospheric pressure.

(c) Shop 99 will ensure that all service outlet valves have been secured.

(4) The entire accessible length of the distribution main, including division valves, branch valves, and blowdown valves adjacent to the main, but not including the branch lines, shall be patrolled by Shop 03/07, and soap-water tests made at every place where leaks are likely to develop, such as valve diaphragm, packing, bonnets, flanges, threaded connections, in such a manner that the system is covered once every quarter.

(5) The branch lines serving piers, drydocks, and shops shall be patrolled and visually inspected by Shop 03/07 in such a manner that all branch lines are inspected once every week. Once every 4 weeks, or more frequently where determined necessary from weekly inspections, the inspection shall include soap-water tests at every place where leaks are likely to develop, such as valve diaphragms and packing, bonnets, flanges, threaded connections, etc.

(6) Each nonreturn-type station outlet valve, in buildings, shall be inspected annually. This inspection shall require the removal of the bonnet for a thorough inspection of the valve seat, gasket, and spring. If any indication of wear or dirt is noted, the valve shall be repaired and tested. A blank tag showing date of installation, subsequent inspections, date when next inspection is due, initials and shop number of inspector shall be attached to each valve. For tests, refer to paragraph 5.

#### 5. Tests by Shop 03/07

a. Operational tests shall be conducted on equipment in accordance with the schedule given below. All equipment shall be tagged showing date of test and identification of person making the test. Perform gas free test upon opening/entering pits. In tests of safety valves and pressure switches, tags shall also show lifting or actuating pressures. Shop 03/07 shall maintain a log of all pressure tests, inspections, and repairs to the oxygen distribution system.

(1) The pressure relief valve installed on the 4-inch header at the tank north of Building 426 shall be tested annually. The pressure relief valve installed on the 2-1/2 inch header in Building 460 shall also be tested annually. Normal set pressure for these relief valves is 185 psi. The test will be accomplished by removing the valve for shop testing. In order to maintain the system up and running, Shop 03/07 shall maintain a spare relief valve to be installed in the system during relief valve testing.

(2) All portable indicating and recording pressure gages shall be cleaned, tested, and calibrated by Shop 67 annually. Refer to paragraph 7d for safety precautions.

(3) The low- and high-pressure alarms at the tank north of Building 426, and at Building 460, shall be tested once each month. Normal actuating pressure for the low-pressure alarm is 90 psi and for the high-pressure alarm is 135 psi. The audible alarms, which have a normal actuating pressure of 90 psi, are installed in Building 460 and at the north side of Building 426, and should be tested annually.

(4) The 1-inch overload or excess flow valves are installed at all outlets used for extending the distribution system by hoses to other manifolds. These valves shall be tested annually in place by subjecting them to atmospheric discharge. Safety precautions must be observed in the vicinity of the escaping oxygen.

(5) Following the annual inspection of station outlet valves as required in paragraph 4d(6), each of these valves shall be tested against backflow conditions. This test shall be conducted annually. Test pressures shall vary from zero to 125 psi in 30-pound increments with pressure applied in the direction opposite to normal flow, to check the tightness of the check valve at both low- and high-back pressures.

b. The entire fixed distribution system shall be given a standing pressure test **once each year**. The system may be sectionalized as considered necessary by the Shop 03/07 Superintendent associated with maintenance, to best facilitate available manpower and arranging for the necessary outages. Excessive pressure loss may also indicate that large leaks have been overlooked in the soap-water tests. A recording pressure gage is better than a simple indicating gage for this purpose. No leakage is indicated by **no** pressure drop. Leakage is indicated by **constant** pressure drop. The pressure line at 125 pounds will vary one pound up or down for a temperature change of about 3.1°F and the change will be very gradual. Any problems will be indicated by **sharp** changes in the pressure line.

(1) Periodic standing pressure tests are also used in determining unavoidable losses for purposes of cost keeping.

(2) The principle of a standing pressure test is to shut off the section to be tested while full of oxygen at operating pressure, lower pressure 5-10 pounds, and then observe whether there is any loss of pressure during a 24-hour period. To avoid misleading results, it is necessary to prevent any flow of gas

into the section under test and any withdrawal of gas from station outlets and to make proper allowances for variations of pressure that are caused by temperature changes.

(3) Before starting the test, each station outlet on the piping to be tested shall be closed and capped with the nut and plug assembly provided. The leak tightness of this outlet seal cap, the valve bonnet, and valve stem joints shall then be tested with soap-water. Any leaks detected shall be repaired before the standing pressure test is started. All section shut-off valves and control valves included in the section to be tested shall be made tight all around before the standing pressure test is started. The next step is to make sure that none of the station outlets within the section to be tested will be open during the test. Unless this can be assured by other means, it is advisable to tag each outlet station with a notice stating that the outlet valves must not be opened for service operations. These tags can be applied just before leaving the stations after soap-water test completion. An alternate method would be to padlock each outlet valve prior to testing.

(4) The piping to be tested shall then be shut off in a manner that will prevent any flow into the section to be tested. If this check indicates leakage through the closed section shut-off valve, it may be possible to stop the leakage by slightly opening and closing the section shut-off valve several times to blow out dirt and scale, thus cleaning the seat. If this fails to remedy the condition, it will be necessary to regrind or replace the valve.

(5) Since changes in the temperature of the oxygen in the piping under test will cause the pressure to change, due consideration shall be given to any change in temperature that may affect the pressure readings so that the temperature effect can be offset, or measured and compensated for. As it is the temperature of the oxygen in the piping under test, which is the governing factor, all temperatures taken for test purposes shall be truly representative of this temperature. In the case of piping located above ground, atmospheric temperatures taken can be employed if they are taken at locations which will give readings representative of the temperature of the pipe and the gas contained in it. For example, where the piping is located indoors, the atmospheric temperature at a location representative of average conditions in the building can be employed. Where the piping is located underground, no allowances need to be made for atmospheric temperature changes since such changes will not affect the pipe temperature enough to require a compensating allowance. The standing pressure test should be continued for a 24-hour period whenever possible. This interval is sufficient to develop pressure changes that can be measured with a satisfactory

degree of accuracy, and generally results in occurrence of like temperatures at the beginning and end of the test. Piping in sunlight develops temperatures higher than the surrounding air.

(6) A report of each test listing the sections tested, total hours under test, and pressure losses shall be forwarded to Code 992.2. Code 992.2 shall review results of the test and initiate corrective action as considered necessary.

## 6. Repairs and Alterations

a. Installation specifications and all materials used should conform to the installation plans for the part of the system involved. **Any additions, subtractions, or modifications to the oxygen distribution system shall be brought to the attention of the Shop 03/07 Oxygen Section (476-2617) and to Code N444.9 (476-3879).** All pipe joints shall be butt-welded, Class P-2.

b. Normal repairs such as valve diaphragm or valve seat replacements and repacking will not require purging the line but every care must be taken to keep the parts and opened line clean and free of oil, water, and grease. **Do not leave an opened line unguarded as it may become contaminated** and install a watertight pipe cap at the end of the shift. Keep all parts absolutely oil and water free. Use compounds mixed with water (no oil or grease) for regrinding valves.

c. Use the same precautions in making repairs and additions as were observed in the installation. New valves must be taken apart and thoroughly cleaned of all oil and grease, and repacked with suitable packing. Do not use naphtha, gasoline, or other petroleum products as cleaner. Cold-cutting and threading shall be done dry or with soap and water; use no oil or oily lubricants.

d. Special preparation of the pipeline is required whenever "hot work" is to be done. Application of heat to loosen threaded joints, or for flame cutting or welding will necessitate purging the section of piping involved to displace the oxygen with nitrogen, carbon dioxide, or other inert gas. Certified gas-free technicians will verify that the system is clear before performing any hot work. Also, a burn permit must be obtained from the Fire Inspectors (Code 1124) prior to any hot work.

e. In addition to the danger of personnel injury and property damage likely to result from the application of flame to piping containing oxygen, even at atmospheric pressure, the oxygen is a potential source of oxidation of the welded metal, resulting in poor welds.



f. To prepare for doing hot work, first close all valves through which oxygen may enter the section and relieve the pressure. Purge inert gas through the pipe work site to displace all oxygen. Where possible, the inert gas should be introduced through an outlet on one side of the work and exhausted on the other side, the exhaust being on the side nearest the shut-off valve. A small amount of the inert gas should be allowed to flow through the pipe past the work while the work is being done. This method will take care of a slight leak through the shut-off valve. Obviously, the leaky shut-off valve must be reported and repaired or replaced when practical.

g. If there is no exhaust outlet between the work and the shut-off valve, a different method must be used. First, the shut-off valve must be tight; prove this with soap-water film over an outlet. Then introduce the inert gas through an outlet and raise the pressure to about 100 pounds and exhaust to atmosphere. Do this at least twice, preferably three times. This procedure will get rid of nearly all of the oxygen.

h. When an inert gas has been introduced into the piping system as a purging agent, it should be completely blown out through an end station with oxygen upon completion of the work.

i. All new piping, fittings, and alterations to existing piping must be tested for leaks with a suitable soap-water solution. After allowing welds to cool, recharge the system with oxygen at normal operating pressure and soap test. Allow pressure to remain in the system and retest with soap-water solution after 1/2 hour, and again 1-1/2 hours later. When practical, the system should be subjected to a 24-hour standing pressure drop test.

j. Shop personnel shall observe oxygen piping located within shops. Any leaks detected, or faulty or damaged valves noticed, shall be reported to Shop 03/07.

## 7. Safety Provisions

a. Oily or greasy substances must be kept away from oxygen equipment. Do not operate oxygen equipment with oily hands or gloves. A jet of oxygen should never strike an oily surface, greasy clothes, or enter a closed container that contains a flammable substance.

b. In an atmosphere of oxygen, combustion is much more intense than in an atmosphere of air. Oils may ignite explosively at ordinary temperature in the presence of compressed oxygen. Because of this, oil, graphite, or other combustible lubricants should never be used in gages, valves, or other oxygen

apparatus. A small increase of oxygen above the normal 21 percent content of the atmosphere will cause an accelerated combustion of burnable material, including clothing. A small leak in a confined space can create a fire hazard of major proportions and a tank or compartment that has become filled with oxygen can retain this excess for several hours.

c. All valves shall be cleaned in alcohol or soapy water and reassembled with care to avoid contamination from the hands. Seal openings for shipping.

d. Gages shall be cleaned with alcohol and soapy water, tested, and calibrated using dry nitrogen by Shop 67.

e. Any attachment to the oxygen distribution system other than for the delivery of oxygen is strictly forbidden. Cross-connections between the oxygen system and compressed air are strictly forbidden. This oxygen system is not to be used for breathing purposes, to ground electrical motors, or to attach temporary guy wires, lines, pipes, or hoses, as these practices are extremely hazardous. All oxygen valve cover boxes or hoses shall be kept clear of hoses, pipes, cables, etc. No looping of oxygen lines (supplying a line from two sources) for temporary services shall be permitted and the number of manifold (user) outlets for each shore connection shall be limited to 20. Hydraulic valves shall not be used in the oxygen distribution lines.

f. Piping of the oxygen distribution system is identified as follows:

(1) All exposed piping in buildings, drydocks, or on piers shall be painted with number 141787 green per MIL-STD-101B.

(2) Piping underground or under piers shall be X-TRU-COAT polyethylene coated, or thermal spray coated for protection from the elements. Identification is determined by designations and locations given on Utilities Engineering (Code N444.9) maps of the oxygen system. Any buried oxygen piping shall be marked above ground with oxygen ribbon per code requirements.

(3) Outlets in buildings and on piers and drydocks are labeled "Oxygen, to be used for welding and cutting only."

## 8. Connection to the Oxygen Distribution System

a. In Shops. Hoses and manifolds may be attached to any available oxygen outlet. The full responsibility for conformance to safety precautions, especially with respect to avoiding oil contamination, rests with the Shop Head whose force is making the

connection. Production Resources Department Shop Heads may elect to request Shop 99 to connect the necessary hoses and manifolds, in which case, Shop 99 is responsible for the observance of safety precautions.

b. At Piers and Docks. Shop Heads shall request Shop 99 to have distribution hoses and manifolds installed prior to need.

c. Attachment of Equipment to Manifold Lines. Qualified personnel may attach oxygen-consuming equipment to any manifold, either in shops or on board ships.

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DISTRIBUTION:

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